

## Systematic Review

# Impact of Type I Diabetes Mellitus and Associated Biopsychosocial Stressors on Mental Health on Indian and Hispanic Children

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## ABSTRACT

### Context

Type 1 diabetes mellitus (T1DM) affects children worldwide, with the highest concentrations in India and the United States (U.S.). Estimates project a potential incidence increase of up to 107% by 2040. Caused by an immune disorder destroying pancreatic cells, T1DM requires strict lifestyle adjustments. This paper focuses on this disease's physical, cultural, and economic challenges to mental health among Indian and Hispanic youth and their families.

### Evidence Acquisition

The authors reviewed recent scholarly literature on type 1 diabetes (T1D) as it relates to mental health among Indian and Hispanic populations aged 18 years or younger. The authors performed a comprehensive search on the PubMed database. After reviewing the retrieved studies, the authors examined 18 fully relevant papers, focusing on the studies' important quantitative and qualitative findings, methods, results and conclusions.

### Results

Financial and emotional burdens of T1D affect Indian and Hispanic families. Many families spend a significant amount of their income on diabetes care. Depression was prevalent among T1D patients, especially in Latinos/Hispanics, and was associated with suicidal ideation. Hispanic caregivers, in particular, face cultural challenges and social isolation.

### Conclusion

Type 1 diabetes creates multiple challenges for Hispanic/Latino and Indian youth and their families. Economic struggles and high treatment costs increase the risk of hospitalization and frequent doctor visits. Adolescents risk developing eating disorders that exacerbate mental health challenges. The burden typically falls on the whole family rather than just the individual diagnosed, indicating that standard mental health interventions become routine for pre-adult patients and their families.

### Keywords

Type 1 diabetes (T1D); Type 1 diabetes treatment; Mental health; Indian youth; Hispanic youth; Psychological disorders; Literature review.

## INTRODUCTION

The effects of type 1 diabetes mellitus (T1DM) and the associated biopsychosocial stressors on the mental health of minority youth is a nuanced relationship that remains largely unnoticed. Besides its harmful effects on patients' physical health, T1DM is a condition that may bring extreme financial and psychological burdens upon a family. By understanding this issue in further detail, researchers and healthcare providers will be better able to treat pa-

tients by having more background on all factors of this disease. As victims of T1DM, youth and their families are often unaware of the correlation between the disease and poor mental health. This review of current literature on the topic provides a clearer picture of the relationship between the disease and its effects on multiple aspects of one's life. It also identifies areas of further research needed to minimize the negative psychological effects of this highly stressful chronic condition.

**BACKGROUND**

In 2022, the International Diabetes Federation (IDF) estimated that 1.52 million individuals under the age of 20 were living with T1DM worldwide. Of this number, nearly 283,000 (18%) lived in India, and over 170,000 (11%) lived in the United States.<sup>1</sup> Within the United States, Mayer-Davis noted that Hispanic youth constituted the fastest-growing cohort within this group.<sup>2</sup> Researchers acknowledge that all diabetes reported numbers are alarmingly low due to widespread undiagnosed or unreported cases. According to recent estimates, the projected incidence of T1DM may be up to 107% higher by 2040, making it a growing concern.<sup>3</sup>

T1DM is an insulin-dependent disease often caused by an inherited immune disorder destroying pancreatic cells. This disorder, primarily diagnosed in childhood, means that an individual's pancreas cannot produce enough insulin to maintain glycemic control. The disease brings dramatic lifestyle adjustments for both patients and families. The treatment plan for T1DM is demanding; it incorporates diet, exercise, and, most commonly, insulin injections. People with type 1 diabetes (T1D) often use these treatments to balance their blood glucose between hyper and hypoglycemia, finding a safe level within the range of too-high or too-low blood glucose levels. Left untreated, this chronic condition can lead to increased thirst, frequent urination, hunger, fatigue, and poor vision due to the body's inability to maintain healthy blood glucose levels.

Worldwide, T1DM creates life-challenging problems for the child or adolescent patient and the surrounding family. Indian and Hispanic youth are particularly susceptible to biopsychosocial stressors associated with T1DM. Biopsychosocial stressors refer to adverse effects of the disease that impacts one's life in three aspects: biologically, socially, and psychologically. The biological impact of T1DM is widely known. Less commonly discussed facets of the disease are social and socioeconomic, such as stigma and financial burdens, and the development of psychological disorders, such as depression and anxiety. In this paper, we focus primarily on the factors of physical health, culture, and economic toll of this disease on mental health.

**METHODS**

To obtain a comprehensive overview of this topic, we conducted a series of searches in the PubMed database for reports that included topics related to "T1D" and "mental health" or "biopsychosocial stressors of the Indian population". We then used PubMed's built-in functionality to further restrict that search to studies of a subpopulation to those 18-years or younger. We repeated the search, this time focusing on retrieving those studies that covered studies of Hispanics younger than 18.

The searches yielded 35 relevant papers. Upon further inspection of the retrieved titles, we discarded 17 papers as they did not fully satisfy all the criteria of the papers we intended to retrieve. As noted in the next section, these papers proved useful in obtaining additional context. Thus, this review included 18 fully relevant papers. For each of these papers, we focused primarily on their results and conclusions and analyzed multiple graphs and data figures, searching for important quantitative and qualitative find-

ings. We also took note of the methods used for each paper, noting similarities and differences in the questionnaires and data used.

**RESULTS****Indians**

As a matter of context, one study retrieved in our search reported on the current knowledge regarding the psychosocial aspects of T1D in Asian-American youth. Approximately 50% of Asian-American youth with T1D are in suboptimal glycemic control. They are, therefore, at high-risk for the devastating acute and chronic complications of T1D.<sup>4</sup> A more specific North Indian cross-sectional survey examined the financial burden for families of 380 children with T1D and used the Modified BG Prasad scale to estimate participants' socioeconomic status (SES). They found that 51.9% of participants belonged to a lower or lower middle SES and that the mean annual spending on glucose monitoring, insulin administration, and laboratory investigations were Indian Rupee (INR) 21,576, INR 28,965, and INR 5069, respectively (total INR 55,185, interquartile range (IQR): 26,575-105,027). The cost of a single visit to the doctor was approximately INR 2889. 30.3% of the families had more than 50% of their total family income spent on diabetes care, with a significant negative correlation with their SES. Even though most needed it, only 11.6% received financial support from any agency, so 36.6% of families had to borrow money. The costs of care for T1D contribute to parents struggling and stressing for funds for their children.<sup>5</sup>

In addition to the financial barriers presented by T1DM, families often experience the psychological and social effects of the disease. One study analyzed the degree of diabetes-related distress in Indian children and mothers through the use of two questionnaires (Problem Associated in Diabetes-Pediatric or Problem Associated in Diabetes-Parents Revised, also referred to as PAID-Peds and PAID-PR), which found that the level of diabetes distress in mothers was significantly higher than in children.<sup>6</sup> Both questionnaires showed that the distress was generally due to diabetes-related emotional problems, treatment-related, food-related, and social support problems. In particular, they established a moderate correlation between diabetes-related emotional problems of mothers and children ( $R=0.38$ ,  $p=0.003$ ) and a strong and significant correlation between treatment-related subdimensions ( $R=0.5$ ,  $p=0.001$ ). Based on these results, researchers recommended that distress interventions be a standard component in the care of T1DM patients and that holistic rather than patient-centered approaches to treatment should be considered.<sup>7</sup>

Another study discussed diabetes-related distress among Indian patients and their parents in a low-income group of Indian caregivers. This study used two questionnaires and the patient's hemoglobin A1c (HbA1C) levels to gather data from 165 parents. Ten percent ( $n=16$ ) of parents in this study suffered from moderate/severe depression. The interaction between moderate/severe depression and social stigma surrounding diabetes was statistically significant compared to children whose parents had no/mild depression. Those whose parents had moderate/severe depression had 0.65 points higher HbA1C for every additional point of diabetes stigma.<sup>8</sup>

Another study focused more on Indian children with T1DM than children and their parents. Patient responses to four questionnaires served as the basis for the study. The questionnaires included: the quality of life (QoL) questionnaire (published by the Dawn youth project), the World Health Organization-5 (WHO-5) well-being index (1998 version), the Child Behavior Checklist (CBCL/6-18), and Malin's Intelligence Scale for Indian Children (MISIC).<sup>9</sup> The study's findings noted that 21.3% of the subjects had "low mood". The study also found that children with a recent diagnosis, older age at onset, lower maternal educational level, and elevated HbA1c received recommendations for more frequent cognitive checkups due to more difficulty acclimating to the disease.

Finally, a similar study on Indian youth and adolescents with T1DM found poor well-being. This study found that 17% of patients and 26 % of the subjects had a low mood. Furthermore, they found that those diagnosed with the disease earlier were generally happier and more optimistic about their life with diabetes than those diagnosed later.<sup>10</sup>

### Hispanics

A large study examining 1,397,933 individuals' racial and ethnic disparities in Medicare 5% file data found that the prevalence of T1D was significantly higher in Hispanics compared with Non-Hispanic Whites.<sup>11</sup>

A treatment study examining the factors associated with suicidal ideation and QoL in diabetic adolescent Puerto Ricans used a Diabetes QoL for Youth questionnaire for 51 recruited youths. Puerto Rican children have one of the highest T1D incidences among minorities in the United States and the highest in Latin America. The researchers found that the variables associated with suicidal ideation were depression, somatic complaints, perceived family emotional support, self-care for diabetes, self-deprecation, helplessness, and hopelessness, among other complaints. Their findings highlight the effect of emotional, cognitive, somatic, behavioral, and relational aspects on the quality of mental health in youth with T1D.<sup>12</sup>

In a multicultural sample looking at depression treatment and satisfaction in T1D patients, researchers used a cross-sectional community-based survey design. They found that 25.3% of the participants reported clinically significant depression. Specifically, 31.6% of Latinos/Hispanics had "high depressive symptoms".<sup>13</sup>

Data collected from six clinical centers across the United States found that White youths (19-years or younger) have the highest T1D incidence. However, a larger relative percent increase in incidence existed among Hispanic youths from 2002 through 2015.<sup>14</sup>

In a qualitative study examining Hispanic caregivers of patients with T1D (age 2-17-years) through interviews, researchers found three relevant overarching themes in their responses: culturally-based nutrition challenges, social isolation and lack of support for T1D care, and hesitancy to embrace diabetes technology. Extensive portions of grains and carbohydrates in the group's

everyday meals can make it hard to follow the strict diet for T1D. Caregivers also widely reported a general lack of support from their partners/spouses and relatives. A cultural lack of acceptance of the seriousness and permanency of T1D is a huge barrier. Many participants also had limited extended family living in the United States, which meant limited familial support. The study also discovered a lack of diabetes education and management skills by anyone other than the primary caregiver. Though many Hispanic parents endorsed a positive perception of diabetes technology as a tool to streamline care, others expressed concerns regarding the physical burden of wearable technology.

Many shared that their children refused to use these technologies, most likely out of embarrassment. This raises the need for more comfortable, sleek, and physically elegant technology, which companies are working hard to achieve.<sup>15</sup>

In another study focusing on American youth of Latino heritage, researchers used an observational, cross-sectional study and assessed sociodemographic variables in a patient's life. Based on the questionnaire results, researchers found no statistical significance associated with any of the sociodemographic variables measured. However, 53.85% of T1DM patients were psychologically distressed. The researchers associated this distress with increased insulin injections per day and drug regimen noncompliance.<sup>11</sup>

In a study discussing barriers to parental involvement when dealing with T1DM, 14 Latino parents participated in individual interviews at a diabetes clinic, completed a demographic questionnaire, and sent their children's diabetes duration and HbA1C to the researchers. Based on this data, researchers found that certain facets of a parent's work-life balance either acted as facilitators or barriers to the level of involvement and resources available to help a child with T1DM and could lead to disparities in health treatment.<sup>16</sup>

### DISCUSSION

T1DM creates many issues that can exacerbate mental health problems for Hispanic/Latino and Indian youth. They often struggle economically and face huge treatment costs. They also face a higher-risk of hospitalization due to severe hypoglycemic or ketoacidosis events, creating more hospital costs and frequent doctor visits. T1D often leads to problems like disordered eating behaviors (DEB) and eating disorders (ED). "Diabulimia", a disorder where someone stops/reduces insulin intake to lose weight, has become a unique issue for those with T1D, further deteriorating one's mental health. DEB/ED in adolescents with T1D can affect their diabetes management, physical and mental health, QoL, and long-term outcomes.<sup>17</sup> As we know, there is high mean annual spending on glucose monitoring, insulin administration, and laboratory investigations for those with T1D. Insulin administration therapy is also a lifelong burden, and parents spend much of their time with childcare duties.

Rapid developments in high-tech treatment innovations and devices give little hope of reduced costs in T1D treatment. The Indian subpopulation studies frequently focused on the fami-

lies as a whole rather than just the patients, indicating that family plays a large role in treating the disease and that the burden typically falls on the whole family rather than just the individual diagnosed. Several broader studies mentioned other familial ties, including mothers and parents, reportedly experiencing more distress than the youth, indicating that greater emphasis is required for cognitively evaluating and assisting family members and patients. Combined with earlier findings of a minimal correlation between sociodemographic variables (such as income, education, and living) and the disease, these findings support greater emphasis on the most effective means to address common needs for T1DM pre-adult patients and their families.<sup>18</sup>

## CONCLUSION

Reviewing the 18 articles noted in this literature review taught us much about the correlation between poor mental health and T1DM. Given the sociodemographic commonalities noted in these papers and many others, perhaps it is time for T1DM researchers to spend less time dwelling on relatively minimal differences in sociodemographic variables among patients.

Instead, researchers should focus on mental health issues related to T1DM patients. Many researchers have touched on the potential mental health needs of those children and adolescents diagnosed with T1D. Some studies have extended the need for care to immediate family supporting the patient.

Other broad areas of research requiring attention include:

- Developing and testing specific interventions to prevent and treat depression and anxiety in children and teenagers with T1D.
- Identifying the most common risk factors among children and teenagers with T1D.
- Examining the impact of various mental health disorders on diabetes management and long-term health outcomes.
- Developing and testing specific interventions to improve mental health and diabetes outcomes in children and teenagers with T1D.

Other, more discrete areas of potential research might include:

- What is the root of the social stigma in certain cultures regarding having T1DM?
- Exploration of the root causes of stress and anxiety that often result in T1DM disease management.
- Given the importance of peer relationships and influence among youth, what do we know about peer groups forming around T1DM? Similarly, exploring online and social media strategies deserves the researcher's attention.
- Longitudinal studies are needed to evaluate the effectiveness of depression treatment in community samples.
- Additional studies are needed to measure and treat mental issues in adults within the family. What would constitute multilevel behavioral interventions that maximize parental involvement in T1D management differences along racial and ethnic lines?

The important relationship between mental health and

managing T1D by the patient and family members is obvious. Presently, the only effective treatment for diabetes relies heavily on careful disease management, which is highly dependent on patient behavior. Of course, behavior among T1D patients appears to be highly susceptible to various mental health and behavior issues. By expanding research to understand better the connection between mental health and T1D, healthcare professionals can develop more effective interventions and improve the care of patients with this chronic condition.

## EIC's COMMENTS

This rather narrative paper is valuable to report. It may show the way of the author's future. An integrated strategy to treat T1DM is necessary, but how? Problems of cost and human resources are always difficult to recruit.

## CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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